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Application Date: March 13, 1944.

No. 4675/44.

Complete Specification Left: March 7, 1945.

Complete Specification Accepted: Aug. 8, 1946.

## PROVISIONAL SPECIFICATION

## Improvements relating to Filters

We, CALLENDER-SUCHY DEVELOPMENTS LIMITED, a British Company, of Hamilton House, Victoria Embankment, London, E.C.4, and CHARLES THEODOR SUCHY, of 5 Austrian Nationality, of 1—3, Marban Place, Kilburn, London, W.9, do hereby declare the nature of this invention to be as follows:—

This invention relates to filters and is concerned with the provision of filter gauze elements.

Gauze filters or screening are constructed of woven metallic wires or filaments or from perforated sheet and in either case the filtering effect cannot be very refined as even with the finest metallic wire the mesh is necessarily on the large size.

A very much finer filtering effect for air and gases can be obtained by the use of ordinary closely woven thin textile fabric such as cotton or linen, silk, nylon and such fabric has been employed in air purification systems. The use of this thin textile material is, however, very limited in practice owing to its fragile nature and the object of the present invention is to provide a material which can be of as fine a mesh as a cotton linen or like fabric but which will be of strong and durable character and capable therefore of wide application.

The invention consists in taking a textile fabric and metallising it in such a manner by electro-deposition that interstices between the strands or yarns are left sufficient to permit the passage of

atoms or particles of minimum size while arresting particles of a larger size.

In particular the invention consists in treating thin linen and cotton sheet material by electro-deposition so as to metallise the woven structure without destroying its permeability to air and gases.

In accordance with the invention we treat the textile material by the electro-deposition process described in our prior Specification No. 3712/44 (Serial No. 572,071).

The metal deposited may conveniently be nickel which we have experimentally found to be satisfactory for filtering the combustible gaseous mixtures used in the operation of internal combustion engines.

It is essential to the present invention that the electro-deposition process employed be such that the internal fibres of the material are metallised in contradistinction to the metallisation of the external surfaces of the material.

The electro-deposition process described in our prior Application before alluded to meets the problem for the reason that it is the only process we know of whereby it is possible to metallise the internal fibres of a fibrous or textile material in contradistinction to the metallising of the external surface of the material.

Dated this 13th day of March, 1944.

A. A. THORNTON,  
Chartered Patent Agent,  
7, Essex Street, Strand, London, W.C.2,  
For the Applicants.

## COMPLETE SPECIFICATION

## Improvements relating to Filters

We, CALLENDER-SUCHY DEVELOPMENTS LIMITED, a British Company, of Hamilton House, Victoria Embankment, London, E.C.4, and CHARLES THEODOR SUCHY, of Austrian Nationality, of 1—3, Marban Place, Kilburn, London, W.9, do hereby declare the nature of this invention and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement:—

[Price 1/-]

This invention relates to filters and is concerned with the provision of filter gauze elements.

Gauze filters or screening are usually constructed of woven or knitted metallic wires or filaments or from perforated sheet and in either case the filtering effect cannot be very refined as even with the finest metallic wire the mesh is necessarily on the large size.

In order to meet this difficulty it has

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been suggested to electro-plate such metallic structures so as to reduce the size of the interstices or openings.

A very much finer filtering effect for air and gases can, of course, be obtained by the use of ordinary closely woven thin textile fabric such as cotton, linen, silk, nylon or the like and some of such fabrics have been employed in air purification systems. The use of this thin textile material is, however, very limited in practice owing to its fragile and hygroscopic nature and the object of the present invention is to provide a material which can be of as fine a mesh as a cotton, linen or like fabric but which will be of strong and durable character and capable therefore of wide application and in particular useful for filtering liquids or vapour laden air and gases.

The invention is carried into practice by taking a textile fabric and metallising it by electro-deposition in such a manner that interstices between the strands or yarns are left sufficient to permit the passage of atoms or particles of a desired minimum size while arresting particles of a larger size.

In other words, we treat thin sheet fabric material by electro-deposition so as to metallise the woven structure without completely destroying its permeability to air and gases.

Thus the invention consists broadly of a filter having a filtering element or elements consisting of a textile fabric metallised by electro-deposition.

In the practice of the invention both the fabric and the metal deposited may vary and it will, of course, be appreciated that the metal employed will be so selected that it is inert to the constituents of the air, gases, vapour or other fluid to be filtered.

As an example for use in the filtering of combustible gaseous mixtures used in the operation of internal combustion engines, we have found that a fabric of woven or knitted nylon metallised by electro-deposition with nickel is suitable and has, in fact, proved effective.

The invention can be carried into practice by subjecting the fabric to the electro-deposition processes described and claimed in our prior Application in Great Britain No. 3712/44 (Serial No. 572,071).

In the manufacture of the nylon-nickel material above alluded to we proceed as follows:—

The nylon material of the selected mesh or weave is first washed and soaked in water and then immersed in a 20% stannous chloride solution. It is then again washed, for example by means of a strong water spray. After this washing

it is immersed in a colloidal silver solution. It is then again washed and thoroughly dried, after which it is brushed to remove, as far as possible, the conductive silver particles from the surfaces, while leaving such particles in the structure of the material beneath the surfaces in accordance with the broad principle outlined in Specification No. 572,071. The material is then subjected to the electro-deposition process proper which should be carried out at low current density. A current density of  $\frac{1}{2}$  ampere at  $1\frac{1}{2}$  to 2 volts will be found to give the desired result.

It will be appreciated that the ultimate size of the filtering mesh can be very precisely controlled, firstly by selecting the size of mesh in the original woven or knitted material and secondly by the extent to which the electro-deposition process is carried.

It will also be appreciated that by selecting the metal to be deposited liquids, gases and vapours having different chemical characteristic can be satisfactorily dealt with. By the use of gold, for example, as the deposited metal—which the economics of the process render commercially practical—sulphuric acid vapours can be filtered without damage to or corrosion of the filtering material.

By means of the invention it is possible to produce filters having filtering elements of light weight of relatively great strength.

It is to be understood that no claim is made by us to textile fabric metallised by electro-deposition and for use otherwise than as a filter element or elements.

Having now particularly described and ascertained the nature of our said invention and in what manner the same is to be performed, we declare that what we claim is:—

1. A filter having a filter element or elements consisting of a textile fabric metallised by electro-deposition.

2. A filter element consisting of a textile fabric metallised by electro-deposition.

3. A filter having a filter element consisting of a textile fabric metallised by electro-deposition with a selected metal inert to the constituents of the fluid to be filtered.

4. Filtering material consisting of a textile fabric comprising woven or knitted nylon metallised by electro-deposition with nickel.

5. The improved filter and filtering elements therefor substantially as described.

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A. A. THORNTON,  
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Napier House, 24—37, High Holborn,  
London, W.C.1,  
For the Applicants.

Dated this 7th day of March, 1945.

Reference has been directed, in pursu-  
ance of Section 3, Sub-section (2), of the  
Patents and Designs Acts, 1907 to 1942  
to Specification No. 573,195.

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